WORK PLAN
FOR
ENVIRONMENTAL FOOTPRINT ANALYSIS
MALLARD NORTH LANDFILL SITE
HANOVER PARK, ILLINOIS
(REVISION 2)

Prepared for:

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
77 West Jackson Boulevard
Chicago, IL 60606

Prepared by:

WESTON SOLUTIONS, INC.
750 E. Bunker Court, Suite 500
Vernon Hills, IL 60061

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Prepared by: _____ Date: 4/20/11
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Reviewed by: Omprakash S. Patel Date: 4/20/11
Omprakash Patel
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1. INTRODUCTION

The United States Environmental Protection Agency (U.S. EPA) has tasked the Weston Solutions, Inc. (WESTON®), Superfund Technical Assessment and Response Team (START) to conduct an environmental footprint analysis of the current remediation system and several alternative systems at the Mallard North Landfill site in Hanover Park, Illinois (the Site). The term "footprint," which is commonly applied to quantification of the emissions of greenhouse gases and carbon dioxide (the "carbon footprint"), refers to the quantification or measure of a specific parameter that has been assigned some meaning. For example, the carbon footprint is the quantification or measure of carbon dioxide and other greenhouse gases emitted by a particular activity, facility, individual, or remedy. The carbon footprint is of interest because emissions of greenhouse gases, including methane and carbon dioxide, have been linked to environmental effects such global warming and related climate change. The term "footprint" can be expanded to other environmental parameters, such as energy use, water use, land use, and air pollutant emissions. The study discussed in this Work Plan will estimate the footprint of a variety of parameters and will attempt to consider all practical contributions to each footprint.

This Work Plan outlines the technical activities necessary to complete the footprint analysis. This Work Plan covers the following four tasks:

- Task 1: Project Planning and Support;
- Task 2: Evaluation of Existing Information;
- Task 3: Environmental Footprint Analysis; and
- Task 4: Footprint Analysis Report.

The project schedule is discussed at the end of this Work Plan.

2. TASK 1: PROJECT PLANNING AND SUPPORT

This task includes the following subtasks:

- Project management;
- Progress meetings; and
- Work Plan preparation.

Each subtask is discussed below.

2.1 PROJECT MANAGEMENT

Project management includes staffing, technical guidance and oversight, monthly reporting, and financial management. Ongoing project management activities will be performed throughout the work assignment. The anticipated period of performance for this work assignment is October 1, 2010, to September 30, 2012. WESTON START will perform the following tasks to provide general work assignment management and coordination to implement the statement of work (SOW):

- General project task, resource, and schedule coordination;
- Cost management and tracking, and invoice preparation and submittal;
- Preparation of monthly technical and financial reports; and
- Project closeout.

The technical and financial monthly progress reports will be submitted to the U.S. EPA in accordance with the contract requirements (each month by the 20th of the month).

Project closeout is necessary to ensure that project files are complete and submitted to the U.S. EPA Records Center and that one set of the files is maintained in the contract archives. Project closeout will occur after final review of the technical files and final financial reconciliation.

2.2 PROGRESS MEETINGS

WESTON START will participate in progress meetings with the U.S. EPA and the project team

on an ongoing basis for the duration of the work assignment. The purpose of these meetings is to discuss work progress and make decisions necessary to ensure that project goals are achieved. The general topics of discussion during the meetings will include work progress, issues and adjustments, budgets, and schedules.

2.3 WORK PLAN PREPARATION

WESTON START has prepared this revised Work Plan incorporating EPA comments to detail the project approach and project schedule. The Work Plan is based on tasks identified by U.S. EPA during discussions with WESTON.

The following activities are included in Work Plan preparation:

- Prepare a detailed Work Plan and task-specific cost estimate (See Attachment 1) and
- Prepare a revised Work Plan, if necessary, incorporating U.S. EPA comments.

3. TASK 2: EVALUATION OF EXISTING INFORMATION

WESTON START will compile historic Site reports and evaluate existing documentation related to the landfill gas (LFG) collection system and the landfill leachate control system. The LFG collection system was constructed in 2009 and made operational in 2010. The landfill leachate control system was constructed and implemented in 2009. The Site is currently in the operation and maintenance (O&M) phase.

WESTON START will review the documents cited below under Task 2.

- EMCON. 1995. "Feasibility Study Report, Mallard Lake North Landfill." Prepared for the Forest Preserve District of DuPage County (FPDDC). November 17.
- EMCON. 1996. "Work Plan for Site Investigation and Remedial Design." Prepared for the FPDDC. June 7.
- RMT Inc. (RMT). 2009. "Landfill Gas Investigation Workplan, Mallard North Landfill." Prepared for the FPDDC. April.
- RMT. 2009. "Revised Landfill Gas Investigation Workplan, Mallard North Landfill." Prepared for the FPDDC. May 5.
- RMT. 2009. "Interim Remedial Action Plan, Mallard North Landfill." Prepared for the FPDDC. June 2.
- RMT. 2009. "Conceptual Plan for Landfill Gas Collection, Mallard North Landfill." Prepared for the FPDDC. August 14.
- RMT. 2009. "Groundwater Monitoring Plan, Mallard North Landfill." Prepared for the FPDDC. November.
- RMT. 2010. "Groundwater Monitoring Plan, Mallard North Landfill, Landfill Gas and Leachate Collection System, Operation, Maintenance and Monitoring Plan." Prepared for the FPDDC.

WESTON START also will review documentation related to footprints and U.S. EPA best management practices, including the documents cited below.

- Environmental Management Support, Inc. 2008. "Energy Consumption and Carbon Dioxide Emissions at Superfund Cleanups." Prepared for U.S. EPA Office of Superfund Remediation and Technology Innovation. May.
- GeoTrans, Inc. 2009. "Remediation System Evaluation & Green Remediation Evaluation, Shepley's Hill Landfill." August 21.

- GeoTrans, Inc. 2010. "Environmental Footprint Analysis of Three Potential Remedies, Former Romic Environmental Technologies Corporation Facility, East Palo Alto, California." May 11.
- U.S. EPA. 2008. "Green Remediation: Incorporating Sustainable Environmental Practices into Remediation of Contaminated Sites." EPA 542-R-08-002. April.

4. TASK 3: ENVIRONMENTAL FOOTPRINT ANALYSIS

This task includes the following subtasks:

- Inventory of existing system;
- Determination of baseline environmental footprint.

Each subtask is discussed below.

4.1 INVENTORY OF EXISTING SYSTEM

WESTON START will create an inventory of existing LFG collection system and landfill leachate control system components. WESTON START will create an inventory of existing components, including, but not limited to, the following:

- Pumps;
- Blowers;
- Piping and fittings;
- Tanks;
- Flares;
- Leachate control trenches;
- Control System
- Energy sources;
- Maintenance items.
- Volume of LFG
- Volume of Leachate

4.2 DETERMINATION OF BASELINE ENVIRONMENTAL FOOTPRINT

Based on the items in the inventory, WESTON START will obtain (when available) appropriate footprint conversion factors from spreadsheets being developed by U.S. EPA Region IX; other

spreadsheet models; or conversion factors will be developed by WESTON START as needed. The footprint conversion factors will be used to convert the items in the inventory into the environmental footprints for the baseline footprint analysis of the system. The footprints for the various environmental parameters will then be estimated by applying the conversion factors to the items in the inventory.

This footprint analysis will include the current system as it is operating assuming no additional changes to the system or monitoring and maintenance schedules. The footprint analysis will not include an evaluation of materials used to construct the current system but will include operation of the system and evaluation of replacement of any capital items for the expected life of the system. Data collected over approximately the last year of operation as evaluated under Task 2, Evaluation of Existing Information, will be used to approximate average energy usage, maintenance, shut-down periods, and other factors to develop the footprint analysis.

4.3 FOOTPRINTING OF ALTERNATIVES

Based on the evaluation of system components and alternative energy sources, alterations to the system will be evaluated. A footprint analysis will be conducted on several modified system alternatives, including the following:

- Production of power from LFG;
  - Using an internal combustion (IC) engine;
  - Micro turbine using LFG;
  - Sterling engine using LFG
- Use of a solar concentrator/Stirling engine to generate power;
- Combinations of the above options (hybrid systems)will also be evaluated (e.g. methane-powered engine could be used at night and/or during excessively cloudy periods when the Solar/Stirling engine is not effective);
- Expansion of existing LFG collection system by installation of additional LFG recovery well(s) to capture pressurized methane that is escaping through some areas of the landfill cap.

This step involves quantifying the environmental footprints of various alterations to the current system components. This evaluation includes estimating for each option the emissions of various environmental parameters, such as greenhouse gases, criteria pollutants, and air toxics, and the resources used, such as energy and water. Additionally, this evaluation will also consider alternative system options.

Also, a concept level long term cost estimate will be performed for each Alternative and combination of alternatives. The cost estimate will include capital cost, start-up, and long term operations and maintenance over a 20 year period.

5. TASK 4: FOOTPRINT ANALYSIS REPORT

WESTON START will summarize the system component inventory, existing system footprint analysis and system alternatives footprint analysis in a summary Footprint Analysis Report.

The report will include, but not be limited to, the following:

- Background and description of existing system;
- Tabulated summary of system components;
- Analysis of existing system;
- Footprint spreadsheet output for existing system;
- Footprint conversion factors;
- Analysis of alternatives;
- Footprint spreadsheet output for various alternatives to the system;
- Photographs of the existing system;
- Recommendations for system; and greening;
- A cost comparison of the modified system alternatives.

WESTON START will prepare a draft Footprint Analysis Report. Upon receipt and incorporation of comments on the draft report, WESTON START will prepare a final Footprint Analysis Report. WESTON START will prepare a total of three hard copies each of the draft and final Footprint Analysis Reports.

After finalization of the report, WESTON START will perform the following tasks as necessary.

- Assist EPA in presentation of the final Footprint Analysis Report to the FPDDC for consideration and possible implementation;
- Assist EPA and FPDDC, if needed, in presenting or interpreting the report to its board of directors.

6. SCHEDULE

The tasks discussed in this Work Plan will be implemented in accordance with the following schedule:

- Submit draft Work Plan to U.S. EPA: November 24, 2010
- Receive comments (if any) from U.S. EPA: December 15, 2010
- Submit revised Work Plan to U.S. EPA: April 20, 2011
- Submit draft Footprint Analysis Report to U.S. EPA: 90 days from receipt of footprint analysis spreadsheets from U.S. EPA

ATTACHMENT 1

ESTIMATED COST

Estimated Cost For Mallard North Carbon Footprint Report

LABOR	LOE	Option Year 1 Rates ($/hr)	Total
Task 1: Weekly Support			
Principal Engineer	20.0	$148.76	$2,975
Engineering Assistant III	8.0	$91.36	$731
Task Subtotal	**28.0**		**$3,706**
Task 2: Evaluation of Existing Information			
Principal Engineer	8.0	$148.76	$1,190
Engineer IV	24.0	$105.79	$2,539
Scientist IV	16.0	$116.51	$1,864
Engineering Assistant III	6.0	$91.36	$548
Task Subtotal	**54.0**		**$6,141**
Task 3: Footprint Spreadsheets			
Principal Engineer	16.0	$148.76	$2,380
Engineer IV	228.0	$105.79	$24,120
Engineering Assistant III	8.0	$91.36	$731
Task Subtotal	**252.0**		**$27,231**
Task 4: Report		($/hr)	
Principal Engineer	24.0	$148.76	$3,570
Engineer IV	80.0	$105.79	$8,463
Scientist III	20.0	$88.77	$1,775
Scientist II	12.0	$75.13	$902
Engineering Assistant III	12.0	$91.36	$1,096
Task Subtotal	**148.0**		**$15,807**
Task 4: Meetings/Presentation			
Principal Engineer	16.0	$148.76	$2,380
Engineer IV	16.0	$105.79	$1,693
Engineering Assistant III	12.0	$91.36	$1,096
Task Subtotal	**44.0**		**$5,169**
Task 5: Financial and Closeout			
Principal Engineer	0.0	$148.76	$0
Engineer IV	0.0	$105.79	$0
Scientist IV	0.0	$116.51	$0
Engineering Assistant III	0.0	$91.36	$0
General Clerk	0.0	$38.73	$0
Task Subtotal	**0.0**		**$0**
SUBTOTAL LABOR	526.0		58,054.4
	Weeks	**Rate**	
Equipment			**Total**
Misc	0	$0.00	$0
SUBTOTAL EQUIPMENT			**$0**
		Rate	
TRAVEL	**Days**	**($/day)**	**Total**
Milage	0	$100.00	$100
SUBTOTAL TRAVEL			$100
EXTERNAL ODCs (Including Subs & Labs)		**Raw $**	**Total**
Copying		$100.00	$109
SUBTOTAL External ODCs			$109
Subtotal			**$58,264**
PMO (5% of Total)			$2,913
Incurred to date -- April 15 2011			$14,500
TOTAL ESTIMATE TO COMPLETE PROJECT	**526.0**		**$75,677**